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Book .M67

A TREATISE

ON THE PRINCIPAL

FIXED STARS AND CONSTELLATIONS,

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365

WITH MAPS,

ILLUSTRATIVE OF THEM AS SEEN IN THE FOUR SEASONS.

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1541

BY HENRY WHITALL.

U. S. A.

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PREFACE.

In giving illustrations of the Fixed Stars, the want of suitable maps has long been felt. To supply this want, the author has constructed those which accompany this little work. True, there are already other valuable school books on this subject, but their maps (which should be the most useful part,) are divided into so many minute parts, each embracing so small a number of the stars, that the task of properly joining them together, so as to form one grand whole, is placed beyond the capacities of pupils generally. This defect also lessens the desire in the more advanced to acquire this most gratifying accomplishment. It is a lamentable fact, that pupils in some of our best schools have spent years in abstruse calculations, hoping thereby to obtain a thorough knowledge of Astronomy, without learning to distinguish one star from another. That all who desire this information may no longer look with confusion at the starry Heavens, but may at once be enabled to point out all the principal Constellations, and Stars as they appear at the different seasons, is the great object of the present undertaking.

INTRODUCTION.

When an uninstructed observer gazes upon the clear nocturnal sky, he is bewildered on beholding the confusion which appears to exist among the stars; but, to the practised eye naught appears but harmony and grandeur. The visible stars have all been numbered and classified, and their relative positions ascertained and mapped with as much accuracy as the different places on the earth.

From a point directly over head, called the *zenith*, the heavens form a great and noble arch, extending in every direction, until they appear to meet the earth in a circle, called the *horizon*. The centre of this horizontal circle is the observer. A semicircle, extending from the northern point in the horizon, through the north pole and zenith to the southern point in the horizon, is called the *celestial meridian*, for the place of observation. While the heavenly bodies are passing this line they are said to be on the meridian.

The attentive observer in the United States has, doubtless, frequently observed that the heavenly bodies in general appear to rise in the east, pass the meridian, and set in the west, at the same distance from the south as they were when they arose. But if we attentively observe the northern part of the visible heavens, we shall perceive that a number of stars there do not descend below the horizon, but apparently revolve, in circles of different dimensions, around a fixed point; the upper part of the circles being described from east to west, and the lower in the opposite direction. The point around which the stars thus appear to revolve is called the *North pole* of the heavens. A star of moderate brightness, situated near this point, is called the *pole star*. A straight line, extending from the north pole of the heavens, through the earth's centre to the opposite side of the celestial vault, is termed the *axis* of the celestial sphere, round which the stars appear to perform their diurnal revolutions, from east to west. The points where this line cuts the earth's surface are the *poles of the earth;* and the intervening line is the *earth's axis*, and the revolution of the earth round this axis from west to east, causes the apparent revolutions of the celestial bodies in the opposite direction.

A plane passing through the centre of the earth at right angles to its axis, cuts the surface in the *terrestrial equator;* and being extended to the concave surface of the visible heavens, forms the *equinoctial circle*, or *celestial equator*. The portions of the earth and the heavens which are situated on the northern and southern sides respectively of this plane, are called the northern and southern hemispheres.

As the earth performs its annual revolution round the sun, suppose the plane of its orbit extended to the concave surface surrounding us, the circle which this plane would form among the stars, by its intersection, would be

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the *sun's apparent yearly path*. This circle is called the *ecliptic*. The ecliptic and celestial equator intersect each other in two opposite points, called the *equinoxes;* and the points in the ecliptic, which are 90 degrees from the equinoxes, and where the ecliptic recedes to its greatest distance from the equinoctial circle, are called the *solstices*.

Two great circles passing through the poles, and the equinoxes and solstices respectively, dividing the heavens into four equal parts, as shown by the line passing through the pole and center of each map, are called the *equinoctial* and *solstitial colures*. Ten other great circles, in addition to these, passing through the poles, and cutting the celestial equator at intervals of fifteen degrees, divide that circle into twenty-four equal parts. These are termed *hour circles*. The *vernal equinox* is the point of the ecliptic in which the sun appears, when the days and nights are of equal length in the spring. As the succeeding part of the ecliptic is in the northern hemisphere, the the sun upon passing the meridian of any place on successive days, will appear to rise more and more to the north, until it arrives at the solstice which is termed the *summer solstice*. Thence it will pass the meridian on succeeding days more and more to the south, crossing the equinoctial again at the *autumnal equinox*, when the days and nights are of equal length in the fall or autumn. The remaining part of the ecliptic is in the southern hemisphere. The sun continues moving on until it arrives at its greatest distance south, called the *winter solstice*, from which it again returns to the north. The splendour of the sun prevents our seeing the stars near it, but those in the part opposite to where the earth is, are visible. The sun passes the vernal equinox about the 21st of 3d mo., (March); the stars in this quarter are visible in autumn: the summer solstice about the 22d of 6th mo., (June), the stars at this point being visible in winter: the autumnal equinox about the 23d of 9th mo., (September); the stars are seen in the spring: and the winter solstice about the 22d of 12th mo., (December), the stars may be seen as shown on the summer Map.

The passage of the sun through the equinoxes is usually termed *crossing the line;* as it passes from one hemisphere to the other.

Extending quite round the heavens, eight degrees on each side of the ecliptic is a zone called the *zodiac*. It is divided into 360 equal parts, called degrees. It is also divided into 12 equal parts of 30 degrees each, called the *twelve signs of the Zodiac*.

In or near this zone are found twelve *wanderers* or *planets*, viz.: Mercury, Venus, Mars, Vesta, Astræa, Juno, Ceres, Pallas, Jupiter, Saturn, Herschel, and Le Verrier, which have a motion from west to east, the same as the earth.

The hours of the day being determined by the passage of the sun over the meridian of the place where the observer is located, and the motion of the earth in its orbit giving to the sun the apparent motion of nearly a degree eastwardly in twenty-four hours, the fixed stars pass the meridian nearly four minutes earlier on each successive night. This, in a month, amounts to about two hours. Hence, if the stars are observed at the same hour of the night, at intervals of a month, those which were on the meridian at the time of the former observation, are found to have passed it about two hours, at the time of the latter. An observation made at a given hour of the night, being repeated at the corresponding hour, after the expiration of six months, would find a different set of stars; those which were on the meridian at the former period being mostly below the horizon; and the positions of the *circumpolar stars*, or those which do not set, being exchanged; such as were above the pole being now below it, and vice versa.

For easy and familiar reference the pupil can take the map appropriate for the season of observation, hold it over head, so that the Northern, Southern, Eastern, and Western horizons shall severally be towards those points. Should it be about nine o'clock, and near the middle of the season, the stars will be seen in the heavens nearly as represented on the map.

The stars which do not sensibly change their situation with respect to one another, are called *Fixed Stars*.

The *declination* of a star is its distance either north or south of the equator, measured on a great circle which passes through the star and the poles of the heavens. Such a circle is at right angles to the equator, and is termed a meridian. The circles parallel to the equator are termed *parallels* of *declination*.

The great circle, or equatorial colure, passing through the pole and vernal equinox, is called the *first meridian*.

The *right ascension* of a heavenly body is the distance on the equator east, from the first meridian, to the meridian passing through that body.

To find when a star will be on the meridian at 9 *o'clock*, first find the star on the map, then observe where the meridian of the star will cut the equator, at which point of meeting will be found the month and day required.

John Bayer, a native of Augsburg, minister of the gospel, who owes his fame to his astronomical knowledge, in 1603 published charts of the Constellations, with a new nomenclature, the stars (according to their magnitude) being denoted by Greek letters. The universal adoption of this nomenclature makes a knowledge of the Greek alphabet indispensable. Hence the letters are here given. α, Alpha; β, Beta; γ, Gamma; δ, Delta; ε, Epsilon; ζ, Zeta; η, Eta; ϑ, Theta; ι, Iota; κ, Kappa; λ, Lambda; μ, Mu; ν, Nu; ξ, Xi; o, Omicron; π, Pi; ρ, Rho; σ, Sigma; τ, Tau; υ, Upsilon; φ, Phi; χ, Chi; ψ, Psi; ω, Omega.

This little work is intended to be to the starry heavens, what the new and improved system of Geography is to the earth. The first step is to learn the Greek letters, so thoroughly that they may be known the instant they are seen; the second is, to apply them to the principal stars in the different constellations on the maps, until they can be correctly repeated on that beautiful outline map, which is spread above us every clear evening.

NAMES OF THE CONSTELLATIONS.

URSA MINOR—*The Little Bear.*
URSA MAJOR—*The Great Bear.*
CASSIOPEA—*Lady in the Chair.*
CEPHEUS—*The King.*
ANDROMEDA.
PERSEUS ET CAPUT MEDUSÆ.
AURIGA—*The Wagoner.*
CAMELOPARDALIS—*The Giraffe.*
LYNX—*The Lynx.*
LEO MINOR—*The Little Lion.*
MUSCA—*The Fly.*
TRIANGULA—*The Triangles.*
PISCES—*The Fishes.*
ARIES—*The Ram.*
TAURUS—*The Bull.*
GEMINI—*The Twins.*
CANCER—*The Crab.*
LEO MAJOR—*The Great Lion.*
VIRGO—*The Virgin.*
LIBRA—*The Scales.*
SCORPIO—*The Scorpion.*
SAGITTARIUS—*The Archer.*
CAPRICORNUS—*The Goat.*
AQUARIUS—*The Water Bearer.*
PISCIS AUSTRALIS—*The Southern Fish.*
ANTINOUS.
AQUILA—*The Eagle.*
DELPHINUS—*The Dolphin.*
EQUULEUS—*The Little Horse.*
PEGASUS—*The Flying Horse.*
HONORES FREDERICI—*Frederick's Glory.*
LACERTA—*The Lizard.*
CYGNUS—*The Swan.*
LYRA—*The Harp.*
VULPECULA ET ANSER—*The Fox and Goose.*
TAURUS PONIATOWSKI—*The Polish Bull.*
SERPENTARIUS VEL OPHIUCHUS—*The Serpent Bearer.*
HERCULES ET CERBERUS.
CORONA BOREALIS—*The Northern Crown.*
BOOTES—*The Herdsman.*
COMA BERENICES—*Berenices' Hair.*
CANIS MINOR—*The Little Dog.*
HYDRA—*The Water Serpent.*
CRATER—*The Cup.*
CORVUS—*The Crow.*
MONOCEROS—*The Unicorn.*
ARGO NAVIS—*The Ship Argo.*
CANIS MAJOR—*The Great Dog.*
ORION.
LEPUS—*The Hair.*
COLUMBA—*Noah's Dove.*
ERIDANUS—*The River Po.*
CETUS—*The Whale.*

A DESCRIPTION

OF THE PRINCIPAL

CONSTELLATIONS AND STARS.

Ursa Minor.—*The Little Bear.*

The *Little Bear* contains seven principal stars so situated as to have the form of a *dipper*, *the Polar star is in the end of the handle*, viz.: α, the *North Polar Star*—by the Greeks called *Synosyrę*, by the Romans *Cynosura*, by others *Ruccaba*, or *Atruccabah*, δ *Vildiur*, ε, ζ, a, β *Kochab*, γ *Pherkad*, η. a, β, γ, are in a line, and called the *Guards of the Little Bear*.

This is a small, though very noted Constellation, on account of the situation and use of its principal star, which is so near the North Pole that it served for ages as a guide to the mariner in directing his bark across the seas. It may also be used to advantage by the practical surveyor, as furnishing a convenient method of drawing a true meridian, for which method see Gummere's Surveying, page 203. It is necessary to know that the Pole Star is not in the true north. It is stated in the *Nautical Almanac* that, on the first of the year 1850, it was a mean distance of 1°, 29′, 23.16″, from the true pole towards Cassiopea, as shown on all the maps. Hence, it appears to move in a circle around the true pole of the heavens, and passes the meridian once when above, and once below the pole, in a sidereal day. The proper time to take observations on this star is when it is on the meridian.

Surveyors wishing to know the variation of their needle can easily do so, by ranging it with the North Pole Star when on the meridian, which time will be readily known by examining the maps while Cassiopea is there also. If the star was exactly at the pole, an observer at the equator would see it (if the air was sufficiently clear) in the horizon; but by travelling any number of degrees towards the north, the horizon would be that number depressed, and the pole star would appear to rise the same number of degrees above the horizon. If, therefore, we observe with a sextant, or other proper instrument, the altitude of the polar, or any other circumpolar star above the horizon, correcting for refraction, when on the meridian; and increase or diminish the altitude, according as the star is below or above the pole, by its distance from the pole; the result will be the *latitude of the place*. If the greatest and least altitude of a circumpolar star be taken on the same night, and corrected for refraction, half their sum will be the latitude of the place.

A great mistake is made by those who suppose the *Pole Star* a fixed point to us, for it is now changing its situation, and moving towards the true north, so that in the year 2150 it will only be 20′ from the pole. The annual variation being 17.71 seconds.

Ursa Major.—*The Great Bear.*

This great Northern Constellation contains a large number of very conspicuous stars, which, when thoroughly learned, and satisfactorily traced out, will ever remain in the mind clear and vivid. This constellation can be seen in this latitude all the year.

The most important stars in it are: α *Dubhe*, β *Merak*, γ *Phekda* or *Phad*, δ *Megrez*, ε *Alioth*, ζ *Mizar*, η *Benetnash;* ψ, ν *Alula Borealis*, ξ *Alula Australis*, μ *Tania Australis*, λ *Tania Borealis;* ι *Talita*, 3, φ, v, h, o; and g *Alcor.*

α and β are called the *pointers*, because they point out the position of the pole. A line from β to α, continued $28\frac{3}{4}°$ degrees beyond the latter, passes nearly through the pole. These, with γ, δ, ε, ζ, and η, form the long known and memorable group termed by many the *Dipper*, or *Ladle;* in some parts of England, "*Charles's Wain*," or wagon drawn by three horses; by others the *Cleaver*, or *Plough.*

The distance from α to β is 5°; from β to γ, 8°; from γ to δ, $4\frac{1}{2}°$; from δ to α 10°; from δ to ε, $5\frac{1}{2}°$; from ε to ζ $4\frac{1}{2}°$; from ζ to η is 7°. As this brilliant cluster is always in view, the student by becoming familiar with them, will have a standard of measure before him, which the eye can make use of in determining the distance between other stars.

ζ, in the handle of the dipper, or tail of the Great Bear, is a beautiful double star. This is one of the most interesting of the stellar systems. The revolution of these stars was noticed in 1781, since which time they have completed one revolution, and eleven years on a second. Alcor, which appears almost to touch ζ, Dr. Dick supposes to be 200,000,000,000 miles from it, and that the smaller revolves round the larger with a velocity not less than 2,471,000 miles every hour. This would be 85 times the velocity of Jupiter, and 23 times that of Mercury, the swiftest planet in the Solar System.

Dr. Dick further observes: "To some minds, not accustomed to deep reflection, it may appear a very trivial fact, to behold a small and scarcely distinguishable point of light immediately adjacent to a larger star, and to be informed that this lucid point revolves around its larger attendant; but this phenomenon, minute and trivial as it may at first sight appear, proclaims the astonishing fact, that SUNS REVOLVE AROUND SUNS, AND SYSTEMS AROUND SYSTEMS. This is a comparatively new idea, derived from our late sidereal investigations, and forms one of the most sublime conceptions which the modern discoveries of astronomy have imparted. It undoubtedly conveys a very sublime idea, to contemplate such a globe as the planet Jupiter—a body thirteen hundred times larger than the earth—revolving around the sun at the rate of twenty-nine thousand miles every hour; and the planet Saturn, with its rings and moons, revolving in a similar manner round this central orb, in an orbit five thousand six hundred and ninety millions of miles in circumference. But how much more august and overpowering the conception of a SUN revolving around another SUN—of a sun encircled with a retinue of huge planetary bodies, all in rapid motion, revolving round a distant sun over a circumference a hundred times larger than what has been now stated, and with a velocity perhaps a hundred times greater than that of either Jupiter or Saturn, and carrying all its planets, satellites, comets, or other globes along with it in its swift career! Such a sun, too, may as far exceed these planets in size as our sun transcends in magnitude either this or the planet Venus, the bulk of any one of which scarcely amounts to the thirteen-hundred-thousandth part of the solar orb which enlivens our day. The further we advance in our explorations of the distant regions of space, and the more minute and specific our investigations are, the more august and astonishing are the scenes which open to our view, and the more elevated do our conceptions become of the grandeur of that Almighty Being who 'marshalled all the starry hosts,' and of the multiplicity and variety of arrangements he has introduced into his vast creation. And this consideration ought to serve as an argument to every rational being, both in a

scientific and religious point of view, to stimulate him to a study of the operations of the Most High, who is wonderful in counsel, and excellent in working, and whose works in every part of his domains adumbrate the glory of his perfections, and proclaim the depths of his wisdom, and the greatness of his power."

Fable says Ursa Major is Calisto, or Helice, one of the attendants of Diana, the great goddess of the Ephesians. See Acts, chap. xix., 21–41. After the jealousy of Juno had changed her into a bear, Jupiter placed her among the Constellations to prevent her being hurt by huntsmen.

Cas-si-o-pe'a.—*Lady in the Chair.*

Is represented as a queen seated on a throne or chair, holding in her hand the branch of a palm-tree. The principal stars are—α *Schedir*, β *Caph*, γ, κ, δ *Rueba*, ε.

This group of stars looks not unlike a chair, which is inverted in respect to the Lady who occupies it.

β *Caph*, and δ *Megres*, in the Great Bear, are nearly at the same distance from the pole, and are near the equinoctial colure. β on the quadrant between the pole and the vernal, and δ on the quadrant between the pole and the autumnal equinox.

Persons wishing to know the latitude of the place they are in, can easily do so by taking the altitude of the Pole star when β and δ are the same height above the horizon—one east, and the other west of the pole. The altitude will be the latitude of the place. Also, the variation of the compass may be as easily told by observing when either of the stars is on the meridian; the other, and the pole star, must be so too, at which time a compass ranged with the N. pole store will show the variation of the needle.

Cassiopea is surrounded by the royal family. King Cepheus, her husband, is on her right; her beautiful daughter Andromeda just above her, and her distinguished son-in-law Perseus on her left.

Mythological history informs us that *Cassiopea was the wife of Cepheus, King of Æthiopia*, and mother of *Andromeda*. She was a queen of matchless beauty, and seemed to be sensible of it; for she even boasted herself fairer than Juno, the sister of Jupiter, or the Nereides, a name given to the sea nymphs. This so provoked the ladies of the sea that they complained to Neptune of the insult, who sent a frightful monster to ravage her coast as a punishment for her insolence. But the anger of Neptune and the jealousy of the nymphs were not thus appeased. They demanded, and it was finally ordained that Cassiopea should chain her daughter Andromeda, whom she tenderly loved, to a desert rock on the beach, and leave her exposed to the fury of this monster. She was thus left, and the monster approached; but just as he was about to devour her, Perseus killed him."

Two hundred and seventy-eight years ago a bright star appeared 5 deg. N.N.E. of β, which is not now to be seen.

On the 8th of 11th mo., 1572, Tycho Brahe, a celebrated Danish astronomer, observed a star in Cassiopea, which increased in brightness until it surpassed a star of the first magnitude. It was seen at noon-day, and without changing its position, it grew darker and darker until the 15th of the 3d month, 1574, when it entirely disappeared, and has never been seen since. "This star exhibited all the different shades of a prodigious flame—first it was of a dazzling white, then of a reddish yellow, and lastly of an ashy paleness, in which light it expired." "It is impossible," says Mary Somerville, "to imagine anything more tremendous than a conflagration which could be visible at such a distance."

Dr. Dick also observes: "The splendour concentrated in that point of the heavens where the star appeared, must have been, in reality, more than equal to the blaze of twelve hundred thousand worlds such as ours, were they all collected into one mass, and all at once wrapped in flames. Nay, it is not improbable, were

a globe as large as would fill the whole circumference of the earth's annual orbit, to be lighted up with a splendor similar to that of the sun, it would scarcely surpass in brilliancy and splendor the star to which we refer." He farther observes, that "within the last century no less than thirteen stars, in different constellations, were seen to have totally perished, and ten new ones to have been created."

La Place observes: "As to these stars, which suddenly shine with a very vivid light, and then suddenly disappear, it is extremely probable that great conflagrations, produced by extraordinary causes, take place on their surface. This conjecture is confirmed by their change of colour, which is analogous to that presented to us on the earth, by those bodies which are set on fire, and then gradually extinguished."

Dr. Good, author of the "Book of Nature," expresses himself thus: "Worlds and systems of worlds are not only perpetually creating, but also perpetually disappearing. It is an extraordinary fact, that within the period of the last century, not less than thirteen stars, in different constellations, seem to have totally perished, and ten new ones to have been created. In many instances it is unquestionable, that stars themselves, the supposed habitations of other kinds or orders of intelligent beings, together with the different planets by which it is probable they were surrounded, have utterly vanished; and the spots they occupied in the heavens have become blanks. What has befallen other systems, will assuredly befal our own. Of the time and manner we know nothing, but the fact is incontrovertible; it is foretold by revelation; it is inscribed in the heavens; it is felt through the earth; such is the awful and daily text, what, then, ought to be the comment."

Ce-phē'us.—*The King.*

The principal stars are: α *Alderamin*, β *Alphirk*, γ *Errai*, η. Cepheus contains a number of small stars. His head and crown are in the milky way, and foot over the north pole. The crown may be easily traced by the small stars ε, δ, ζ and σ. This constellation is nearly on meridian at 8 o'clock on the 3d of 11th mo.

By examining the maps it will be seen that the nearer the stars are to the pole, the smaller will be the circle in which they appear to move, and the less their apparent motion. Like Cassiopea, it may be seen every clear evening; for, to us, it never sets.

The pole of the heavens performs a revolution around the pole of the ecliptic in 25,600 years, which change will bring γ, or Errai, 1° 50′ from the pole in the year 4200, so that γ will then be the N. pole star. In the year 6000 β Alphirk, will be 4° from it. β will then be the pole star. In the year 7500 α Alderamin, will be 2° from the pole, and for the same reason it will then be the pole star.

An-drom'e-da.—*Called by the Arabs Phoca, the Seal,*

Daughter of King Cepheus and Cassiopea, is on the meridian at 10 o'clock the 10th of 11th month.

The principal stars are α *Sirrah*, δ, β *Merach*, γ *Alamak*. α should be well fixed in the mind. It is one of the stars in the great square of Pegasus. It, with γ Pegasus, 14° south of it, β Cassiopea, 30° degrees north of it, and the N. pole, mark out the position of that great circle in the heavens from which the longitude, and right ascension of all the heavenly bodies are measured.

Per'se-us et Caput Medusæ.—*Perseus and Medusa's Head.*

Is on the meridian the 24th of 12th mo., (December.) Let it be remembered that when a constellation is spoken of as being on the meridian, it is the center, and at 9 o'clock. The principal stars are α *Merzak*, or *Algenib*, β *Algol*, γ, δ, ν, ε, μ, c, ρ; ο *Alix*, and υ, *Nembus*. Medusa's head is part of the constellation Perseus. It is a trunkless head, crowned with snakes, instead of hair. Its chief star, β, is on the meridian the 21st of 12th mo., (December.)

β Algol, in the head of Medusa, is worthy of particular notice, as it at times blazes forth as a star of the 2d magnitude. In three and a half hours it decreases to the 4th magnitude, and back again in the same time. It then remains at its brightest for two and three quarter days, when the same changes take place. In 1783, John Goodricke, of York, England, by repeated observations on this star, determined that its regular periodical variation takes place in 2 days, 20 hours, 48 minutes, and 56 seconds.

The immense distance of the stars puts it out of the power of man to tell with certainty what takes place on their surfaces, but still learned men have formed various opinions respecting their changes.

Dr. Herchel writes thus: "The rotary motion of stars upon their axis is a capital feature in their resemblance to the sun. It appears to me now, that we cannot refuse to admit such a motion, and that indeed it may be as evidently proved as the diurnal motion of the earth. Dark spots, or large portions of the surface less luminous than the rest, turned alternately in certain directions, either towards, or from us, will account for all the phenomena of periodical changes in the lustre of the stars, so satisfactorily, that we certainly need not look out for any other cause." According to the Greek fable, Perseus is son of Jupiter by Danae. He gained the heart and hand of Andromeda by slaying the sea monster just as he was about to devour her; loosed her from the rock where she was chained, and bore her off in triumph.

Au-rī'ga.—*The Wagoner.*

The Charioteer, or Wagoner, with a goat and her kids, is due north of Orion, one of the brightest constellations in the heavens. They are on the same meridian, and culminate at the same time on the 24th 1st mo:

The principal stars are α or the *Goat*, or *Capella*, or *Alhajot*, β, or *Menkalina*, δ, ε, ζ, η, ϑ.

The stars in this constellation are so situated that they form several beautiful triangles, which the ingenious pupil can easily trace by referring to the maps. While the Wagoner is on the meridian, we have a more sublime view of the heavens than at any other season.

Charles Hutton, LL.D., in his dictionary, states that "the Greeks probably received this, and all their other constellations from the Egyptians; but, wanting to appear the inventors of them themselves, and not understanding the meaning of the figures, they have clothed them with some of their own fabulous dresses to favour the deceit."

Cam'el-o-par-da-lis.—*The Camelopard.*

This constellation was made in the beginning of the seventeenth century, by Hevelius, out of the unformed small stars, scattered over a large space between the Wagoner and the North pole, and between Cassiopea and Ursa Major. The stars are all small, and are situated so far from each other, that it is difficult to trace them. Its brightest stars are of the fourth magnitude, of which there are five.

Lynx.

This constellation was also established by Hevelius. Its center is on the meridian, the 23d of 2d mo., (February.) It contains only a few small stars.

Leo Minor.—*The Little Lion.*

This constellation was also established by John Hevelius, the celebrated astronomer of Dantzic.

It is on the meridian on the 6th of 4th month. The stars are all small, but can be easily traced by referring to the maps.

Mus-ca.—*The Fly,*

Is a small constellation, containing one star of the 3d, and two of the 4th magnitude, viz. *a*, *b*, *c*.

Triangula.—*The Triangles.*

This constellation formerly contained but one triangle, but Hevelius added a second, which is still retained.

The stars are all small; the largest are α *Mettallah*, β and γ.

Pis'cēs.—*The Fishes.*

This constellation is now the "Leader of the Celestial Hosts." It is on the meridian on the 24th of 11th month, (Nov.) The stars are all small; the principal ones are of the 4th magnitude, viz., α or *El Rischa*, η, ε, ζ, ω, and γ.

The sun enters this sign on the 19th of 2d mo., (February,) but does not reach the constellation until the 6th of 3d month, (March.)

The annual precession of the stars has caused the constellation Pisces to occupy the sign of Aries, Aries that of Taurus; each constellation having advanced one whole sign in the order of the zodiac.

The character (♓) is supposed to have the appearance of two fishes, tied back to back.

This constellation occupies a large triangular space in the heavens. Commencing at β Andromeda, it goes S.S. Easterly to α; there it takes a westerly course, embracing a number of small stars, until it comes near to η, ζ, γ, π, so situated that they have the appearance of the letter Y in the urn of the Water Bearer.

It is very probable that this sign originated from the fact, that when the sun was in it, fish were abundant, and easily taken.

The ancient Greeks, who have some fable to account for the origin of almost every constellation, say "that as Venus and her son Cupid were one day on the banks of the Euphrates, they were greatly alarmed at the appearance of a terrible giant named Typhon. Throwing themselves into the river they were changed into fishes, and by this means escaped danger. To commemorate this event Minerva placed two fishes among the stars."

A′ri-ēs.—*The Ram.*

A′ri-es, the first sign, but second constellation in the order of the zodiac, is on the meridian the 5th of the 12th mo., (December.)

Hipparchus, of Nicæa, in Bithynia, who flourished about a century and half before the Christian era, and who was the first to number the stars, and reduce them to a catalogue, informs us that Aries in his time was on the equatorial colure, and the first sign in the zodiac. But owing to the precession of the equinox, the constellations advance from the equinox 50″ every year. This, since the time of Hipparchus has amounted to more than a sign. Hence, the constellation Pisces occupies the sign of the zodiac where Aries was anciently found, in other words, each constellation has advanced one sign in the zodiac; so that Pisces now occupies the place of Aries, Aries that of Taurus, Taurus that of Gemini, &c.

The principal stars of Aries are α *Arietis* or *Hamel*, β *Sheratan*, γ *Mesarthius*.

α Aries, being near the plane of the moon's orbit, is often used by mariners to determine the longitude of the place where they are on the ocean. By observing with a Hadley's sextant the distance of the moon, and a known star, together with their altitudes, the longitude may be computed.

Should he get lost, he can (with this portable instrument, which he can hold in his hand, and no better footing than the deck of his vessel,) take the distance between this star and the moon, and calculate his position, as well as his course and distance from any harbor, or port on the earth.

The stars chiefly used for this purpose by mariners are: α *Arietis;* α *Aldebaran* in Taurus; β *Pollux*, in the Twins; α *Regulus*, in the Great Lion; α *Spica*, in Virgo; α *Antares*, in the Scorpion; α *Altair*, in Aquila; α *Markab*, in the great square of Pegasus; and α *Fomalhaut*, in the Southern Fish.

"Capt. Basil Hall, of the royal navy, relates that he sailed from San Blas, on the west coast of Mexico, and after a voyage of 8000 miles, occupying eighty-nine days, arrived off Rio Janeiro, having in this interval passed through the Pacific ocean, rounded Cape Horn, and crossed the South Atlantic, without making any land, or seeing a single sail in the voyage. Arrived within a few days sail of Rio, he took a set of lunar observations to ascertain his true position, and the bearing of the harbor; and shaped his course accordingly. "I hove to," says he, "at four in the morning till day should break, and then bore up; for although it was hazy, we could see before us a couple of miles or so. About 8 o'clock it became so foggy that I did not like to stand in further, and was just bringing the ship to the wind again before sending the people to breakfast, when it suddenly cleared off, and I had the satisfaction of seeing the great sugar-loaf rock, which stands on one side of the harbor's mouth, so nearly right ahead, that we had not to alter our course above a point in order to hit the entrance of Rio. This was the first land we had seen for three months, after crossing so many seas, and being set backwards and forwards by innumerable currents and foul winds."

The ancients having no instruments that would measure time exactly, had recourse to a very easy, but ingenious method of dividing the zodiac into the twelve signs, or equal parts. "They took a vessel with a small hole in the bottom, and having filled it with water, suffered the same to distil, drop by drop, into another vessel set beneath to receive it, beginning at the moment when a star rose, and continuing till it rose the night following, when it would have performed one complete revolution in the heavens. The water falling down into the receiver, they divided into twelve equal parts: and having twelve other small vessels in readiness, each of them capable of containing one part, they again poured all the water into the upper vessel, and observing the rising of some star in the zodiac, at the same time suffered the water to drop into one of the small vessels. As soon as it was full they removed it, and set an empty one in its place. Just as each vessel

was full they took notice what star in the zodiac rose at that time, and thus continued the process through the year, until the twelve vessels were filled."

Having thus divided the zodiac, or sun's apparent path, into twelve equal spaces of 30 deg. each, they called them the twelve signs of the zodiac. The sun appears to pass over one sign a month; through the whole in a year.

The stars that rose in the zodiac while the first vessel was filling were called Aries, an animal held in much esteem by the Chaldean Shepherds; those that rose while the second vessel was filling were called Taurus, &c.

"According to fable, this is the ram which bore the golden fleece, and carried Phryxus and his sister Helle through the air, when they fled to Colchis from the persecution of their step-mother Ino. The rapid motion of the ram in his aerial flight high above the earth, caused the head of Helle to turn with giddiness, and she fell from his back, into that part of the sea which was afterwards called *Hellespont* in commemoration of the dreadful event. Phryxus arrived safe at Colchis, but was soon murdered by his own father-in-law, Ætes, who envied him his golden treasure. This gave rise to the celebrated Argonautic expedition, under the command of Jason, for the recovery of the golden fleece."

Tau'rus.—*The Bull.*

Is the third constellation in the order of the zodiac. In the days of Noah, the year opened when the sun was in Taurus. Taurus was for 2000 years the leader of the Celestial Host. Aries next took the lead, and now the Fishes. Taurus is on the meridian the 10th of first month, (Jan.)

The principal stars are α *Aldebaran*, β *Aurigæ*, or *El Nath*, ζ, γ *Hyadum* I., δ *Hyadum* II., ε *Ain*, *Hyades* and *Pleiades*, or *Seven Stars*.

α, γ, δ, ε, and ϑ, form a beautiful resemblance of the letter V. This cluster is called *Hyades*.

Pleiades, or seven stars, in the fable, are called the seven daughters of Atlas; their names are: η Alcyone, β Electra, δ Merope, Maia, Tayeta, Sterope and Celeno.

Merope is dim among her sisters, because she was the only one who married a mortal.

O. M. Mitchell, Director of the Cincinnati Observatory, writes thus: "η, Tauri—Right Ascension—3 h., 37 m., 59 s. Decl.—N. 23 deg., 36 m., 3 s. Alcyone, the principal star in the Pleiades, a small cluster visible to the eye in the neck of Taurus. This little group has ever been remarkable, but recently a ten-fold interest has been given to it by the announcement of Dr. Madler, of Dorpat, Russia, that its chief star, Alcyone, is the CENTRAL SUN of our astral system. It is absolutely certain that the law of gravitation extends to the fixed stars, as is abundantly shown by the orbitual revolution of the double stars, whose periods and places have been computed by the application of this law.

This being certain, in the mighty group of millions of stars with which our own sun is associated, there must be a center of gravity; and it then remains to determine whether this point is filled by a ponderous globe, of vast dimensions, and bearing the same relation in point of magnitude to the millions of suns by which it is surrounded, as our own sun does to the planets, satellites, and comets by which it is encircled. Analogy, in the solar system, taught the existence of such a ponderous mass, but this analogy was broken in the revolving stars, in which it often occurs that the components are nearly equal in magnitude, moving round a common center of gravity.

Again, in examining the heavens, such a mighty preponderating body would be detected by the swifter proper motion of the stars in its vicinity. After a laborious search, Madler reached the conclusion that no such vast globe existed, and that the center of gravity, (probably vacant,) could only be found by a severe examination of the proper motions of the fixed stars. By a beautiful train of reasoning

and closely conducted research, he finally reached the conclusion that Alcyone, in the Pleiades, now holds the high rank of central sun; but that in the course of ages, by the changes constantly going on among the components of our astral system, this rank may pass to some other star. He computes roughly the distance of Alcyone, and reckons it to be so great, that light, flying with a velocity of twelve millions of miles a minute, cannot reach us from that star in less than 537 years. He further computes roughly, that our sun revolves about Alcyone in a period of 18,200,000 years, in an orbit inclined to the ecliptic, under an angle of 84 deg. 00 m. Should this wonderful theory be confirmed, the proper motions of the fixed stars assume a new and increased interest.

Grecian mythology states that Jupiter became enamored with Europa. In order to deceive her, he transformed himself into a snow white bull, and mingled among the herd, where she became so much pleased with his beauty and tameness, that she mounted on his back; he then bore his rich prize across the seas into the country that derived from her its name. In honor of which service Jupiter placed the bull among the constellations.

Taurus, in the Hebrew zodiac, is ascribed to Joseph.

Gem'i-nī.—*The Twins.*

This constellation culminates about the 24th of 2d month, (February.) The chief stars are: α *Castor* or *Apollo*, β *Pollux* or *Hercules*, δ *Wasat*, ζ, ε *Mebusta*, μ, η *Tejat*, and γ *Alhena*.

The sun passes through this constellation between the 21st of 6th month, (June,) and the 23d of 7th month, (July.)

α and β, the two principal stars in this constellation, have a sensible variation in brightness. Some astronomers suppose β to vary from the first to the third magnitude. Herschel, who observed these stars for twenty-five years, believes the variation of Alpha to be owing to two stars very close together; the less revolving around the larger in a period of 342 years and two months.

The fabulous account of this constellation is, that "Castor and Pollux were twin brothers, sons of Jupiter, by Leda, the wife of Tyndarus, king of Sparta. Among the ancients, and especially among the Romans, there prevailed a superstition that Castor and Pollux often appeared at the head of their armies, and led on their troops to battle and to victory."

St. Paul, after being wrecked on the island of Malta, embarked for Rome "in a ship whose sign was Castor and Pollux," so named, no doubt, in accordance with the popular belief that these divinities presided over the science and safety of navigation.

Castor and Pollux were worshipped both by the Greeks and Romans, who sacrificed white lambs upon their altars. In the Hebrew zodiac, the constellation of the Twins refers to the tribe of Benjamin.

Can'cer.—*The Crab.*

This is now the fifth constellation in the zodiac. It contains but few important stars, the principal of which are: α *Acubens* or *Sertan* or *Ezzaban*, β, δ *Southern Asellus*, 9, ε *Præsepe* or the *Manger*, γ *Northern Asellus*, and ι.

Cancer is on the meridian on the 11th of 3d month, (March.) The sun reaches this constellation about the 23d of 7th month, (July.)

Leo Major.—*The Great Lion,*

Is the sixth constellation of the zodiac. Its center is on the meridian the 6th of 4th month, (April,) at 9 o'clock.

This beautiful constellation contains a large number of brilliant stars, which are easily traced. The chief of them are α or *Regulus*, η, γ or *Algieba*, ζ or *Aldhafera*, μ or the Northern *Rasel-Asad*, ε or the Southern *Ras-el-Asad*, λ, κ or *Minchir ;* β or *Denebola*, E., δ, or *Zosma* or *Hur-el-Asad*, ϑ; ι, χ, σ, τ, ν and e.

α was named Regulus from an illustrious Roman consul of that name. It is a bright star, and less than a $\frac{1}{2}^{\circ}$ from the ecliptic, and much used by mariners to obtain their longitude while at sea.

When the sun entered Leo the heat was very great, which caused the streams to dry up, and the lions to leave their desert retreat, and haunt the banks of the Nile, so that we might naturally expect to find the lion in his present position.

In the Hebrew zodiac, Leo is assigned to Judah, as can be seen Genesis, 49 chap., 9th v. "Judah is a lion's whelp:—he stooped down, he couched as a lion, and as an old lion: who shall rouse him up?" Rev., chap. 5, v. 5. "The lion of the tribe of Judah hath prevailed."

Vir'go.—*The Virgin.*

This is the seventh constellation in the ecliptic. Its centre is on the meridian about the 23d of 5th month, (May.) The sun enters the sign of Virgo on the 23d of 8th month, (August,) but does not enter the constellation until the 15th of 9th month, (Sept.)

The chief stars are, α *Spica the ear of corn* or *Azimech*, ϑ, γ, η *Zaniah*, β *Savijava ;* ν, o; ε *Almuredin* or *Vindemitrix*, δ, ζ, τ; z, φ, ι, κ, λ and μ.

γ, a star of the 4th magnitude, affords scope for reflections of the most profound nature. How grand and sublime is the fact that the earth moves through space at the rate of a thousand miles per minute, at the same time accompanied by its moon. But how much more grand to contemplate that the planet Jupiter, *thirteen hundred times* as large as the earth, moves in the same direction, accompanied by four moons. And still more grand, that the center round which they are moving, viz., the sun, is fourteen hundred thousand times as large as the earth! It is difficult to conceive the immense size of this great luminary. Were the sun's center placed in the center of the moon's orbit, it would not only fill it up, but extend two hundred thousand miles beyond it in every direction; thus filling with one solid mass the moon's orbit, and extending nearly as far beyond as the moon is from the earth. A body of such stupendous dimensions, maintaining its position in boundless space, tells at once of the might and power of its great Creator.

Astronomers believe each fixed star to be a sun similar to our own. The star γ in Virgo is a double star; the smaller one revolves around the larger in 145.409 years. There we behold one sun revolving around another, either of which may be as large as ours. Such is but a faint idea of the immensity and grandeur of the heavenly bodies.

According to fable, Virgo was the goddess of justice.

Li'bra.—*The Scales,*

Is on the meridian about the 22d of the 6th month, (June.) The sun enters the sign on the 23d of the 9th month, (September,) at the autumnal equinox, but does not reach the constellation until the 27th of 10th month, (October.)

The chief stars are, α *Zuben el Genubi*, β *Zuben el Chimali*, π, γ *Zuben el Akrab.*

When the sun enters the sign of Libra, the days and nights are equal, which is beautifully represented by the Scales or Balance.

In speaking of the sign it must not be taken for the constellation ; but let it be remembered that the constellations have advanced one whole sign in the order of the ecliptic ; therefore, the sign is left behind about thirty degrees; so that Virgo now occupies the place that Libra did 22 centuries ago.

These are supposed to be the scales held by Virgo, the goddess of justice.

The Greeks declare the balance was placed in the heavens in honor of Mochus, the inventor of weights and measures.

Those who refer the twelve signs to the twelve tribes of Israel call the balance Asher.

Scor'pi-o.—*The Scorpion,*

Is the ninth constellation in the order of the ecliptic. The sun enters this sign on the 23d of 10th month, (October,) but does not reach the constellation until the 20th of the 11th month, (November.) It is on the meridian on the 10th of 7th month, (July.)

The chief stars are, α *Antares*, β *Akrab*, δ *Dschubba*, π ; τ, ϵ, μ, ζ ; κ, ϑ, ι, κ, λ or *Schaula*, ν or *Lesath.*

The stars of this constellation are very bright, and so situated as to form a beautiful resemblance of a bow kite. α, β, δ and π form the body of the kite, and the remaining stars mark the bobs or tail.

The ancients considered Scorpio a sign accursed.

The sun entered this sign in the fruit season, and its passage through it was often accompanied by many fatal diseases, which were fitly represented by the Scorpion, a deadly creature.

Orion is represented to have boasted that there was not an animal on the earth which he could not conquer. Juno, to punish the hero's vanity, caused the Scorpion to rise out of the earth and sting him, which caused his death.

Sag-it-ta'ri-us.—*The Archer,*

Is the tenth constellation in the zodiac. The sun enters this sign on the 22d of 11th month, (November,) but does not arrive at the constellation until the 7th of 12th month, (December.) It is on the meridian on the 17th of 8th month, (August.)

The chief stars are, μ, λ or the *Northern Kaus*, φ, σ, τ, ζ ; δ or the *Middle Kaus*, ϵ or the *Southern Kaus*, o, π and D. α or *Alrami* or *Ruchbali ur Ramih*, β^1 or the *First Urkab ur Ramih*, β^2 or the *Second Urkab ur Ramih*, are so near the horizon as to be scarcely visible, except when on

the meridian, and under favourable circumstances. μ and λ being in the milky way form the handle, and φ, σ, τ and ζ the bowl of an inverted dipper, and, from their situation, they have been called the milk dipper.

"This constellation, it is said, commemorates the famous Centaur Chiron, son of Philyra and Saturn, who changed himself into a horse, to elude the jealous inquiries of his wife Rhea."

Cap'ri-cor-nus.—*The Goat,*

Is the eleventh constellation in the order of the zodiac. It is on the meridian about the 18th of 9th month, (Sept.) The sun arrives at this sign on the 21st of 12th month, (December,) but does not reach the constellation until the 16th of 1st month, (January.)

The chief stars are, α *First Dschabe*, α *Second Dschabe*, β *Dabih* or *Dschabih*, γ or *Deneb Algedi*, δ *Scheddi*, ζ, φ.

It is said that while Bacchus and other deities were feasting on the banks of the Nile, the terrible giant Typhon came suddenly upon them, and compelled them to assume other shapes to escape his fury. Bacchus plunged into the river, the part under water took the shape of a fish, that above of a goat; the whole a water goat. To preserve the memory of this frolic, Jupiter placed him among the constellations in his metamorphosed shape.

A-quā'ri-us.—*The Water-bearer,*

Is the twelfth constellation in the zodiac. It is on the meridian the 15th of 10th month, (October.)

The chief stars are, α *Sad El Melik*, β *Sad Es Saud*, ϑ *Ancha*, δ *Scheat*, ι; η, ζ, γ *Sadachbia*, π.

η, ζ, γ, π are so situated as to form the letter Y.

The zodiac line—where gleams the solar light,
Twelve constellations form its circle bright:
The Fishes first shine foremost of the line,
Then Aries follows with his light divine,
Next Taurus comes; and now the Twins appear,
And then the Crab, with his refulgent sphere,
And now the year one half its race has run,
When Leo sparkles like a brilliant sun.
Then comes the Virgin, bathed in purer light,
And now the Scales, and then the Scorpion bright,
Next glows the Archer; now the Goat appears,
And last the Water-bearer fills the circling years.

T. B. Dorsey.

Pis'cis Australis.—*The Southern Fish,*

Is on the meridian on the 15th of 10th month, (October.)

Its principal star, α Fomalhaut, is much used by navigators to find their longitude at sea. The remaining stars are β, ε, ϑ, ι.

An-tin'o-us.

This small constellation was invented by Tycho Brahe, in honour of Antinous, a youth of Bithynia, in Asia Minor. The stars are, ϑ, η, l, κ and λ.

Aq'ui-la.—*The Eagle.*

It is on the meridian about the 31st of 8th month, (August.)
The chief stars are, α *Altair*, β *Aschain*, γ *Tarazed*, μ, δ, ε, ζ *Deneb el Okab.* α is much used to obtain the longitude at sea.

Some suppose this to be the eagle which brought nectar to Jupiter while he lay concealed in the cave at Crete, to avoid the fury of his father, Saturn. Some of the ancient poets say, that this is the eagle which furnished Jupiter with weapons in his war with the giants.

Del'phi-nus.—*The Dolphin.*

This beautiful little constellation is on the meridian on the 16th of 9th month, (Sept.)
The chief stars are, α *Svalozin*, β *Rotanew*, δ, γ, ε *Deneb el.* α β, δ, γ form the figure of a diamond, known by the name of Job's Coffin.

The Dolphin, according to some mythologists, was made a constellation by Neptune, because one of those beautiful fishes had persuaded the goddess Amphitrite, who had made a vow of perpetual celibacy, to become the wife of that deity; but others maintain, that it is the Dolphin which preserved the life of the famous lyric poet and musician Arion, who was a native of Lesbos, an island in the Archipelago.
He went to Italy with Periander, tyrant of Corinth, where he obtained immense riches by his profession. Wishing to revisit his native country, the sailors of the ship in which he embarked, resolved to murder him, and get possession of his wealth. Seeing them immovable in their resolution, Arion begged permission to play a tune upon his lute before he should be put to death. The melody of the instrument attracted a number of dolphins around the ship; he immediately precipitated himself into the sea, when one of them, it is asserted, carried him safe on his back to Tænarus, a promontory of Laconia, in Peloponnesus, whence he hastened to the court of Periander, who ordered all the sailors to be crucified on their return.

Equūleus.—*The Little Horse, or the Horse's Head.*

The stars in this little constellation are all small. α Kitalphar, and δ are of the fourth magnitude.

Peg'a-sus.—*The Flying Horse.*

The western part of this large constellation passes the meridian on the 3d of 10th month, (October,) and the eastern on the 11th of 11th month, (November.)

The chief stars are, α *Merkab*, β *Scheat*, γ *Algenib*; ε *Enif*, g; ξ *Homan*, ϑ *Badhan*, η *Matar*.

α, β, γ in Pegasus, and α in the head of Andromeda, form the *great square of Pegasus*, sometimes called the *table*.

γ Pegasus, α Andromeda, β Cassiopea, and the north pole star, are near the first meridian, from which line the longitude, and right ascension, of all the heavenly bodies are reckoned east. This line is on the meridian at 9 o'clock, about the 10th of 11th month, (November.) It cuts the equator and ecliptic at a point called the vernal equinox, where the sun crosses about the 21st of 3d month, (March.)

This is the Flying Horse which mythologists pretend sprung from the blood of Medusa, after Perseus cut off her head. He became the favourite of Apollo and the Muses.

After being tamed by Neptune, or Minerva, he was presented to Bellerophon, son of Glaucus, king of Ephyre, to assist him to conquer the Chimæra, "a hideous monster that continually vomited flames." After the conquest, Bellerophon mounted Pegasus, intending to fly to heaven, which so enraged Jupiter, that he sent a gad-fly to sting Pegasus, so that his rider was thrown to the earth; but Pegasus continued his flight to heaven, and was placed by Jupiter among the constellations.

Frederick's Glory.

This small constellation, north of Pegasus, was formed by Bode in 1787, in honour of Frederick II., king of Prussia, surnamed the GREAT.

La-cer'ta.—*The Lizard.*

This small constellation was formed by Hevelius, and is composed entirely of small stars.

Cyg'nus.—*The Swan.*

This remarkable constellation is represented as a swan, with outstretched wings, and flying down the milky-way.

Its principal star α is of the first magnitude. It is on the meridian at 9 o'clock on the 16th of 9th month, (September.)

The chief stars are, α *Arided*, or *Deneb Cygni*, β *Albireo*, γ *Sadr*, δ *Ginah*, which may be readily known by their forming a great cross of bright stars in the milky way.

Dr. Herschel says that, "in the small space between γ and β, the stars in the milky-way seem to be clustering into two separate divisions, each division containing more than one hundred and sixty-five thousand stars."

γ varies in brightness, from the 3d to the 6th magnitude, but its variations are not regular.

φ is also a variable star. A variable star was discovered by Anthelme, in the head of Cygnus, on the 20th of 6th month, (June,) 1670, when it was of the 3d magnitude; but in the following 10th month, (October,) it was scarcely visible. In the 1st of 4th month, (April,) it appeared brighter than at first. After several similar changes it disappeared in 3d month, (March,) 1672, and has not been seen since. 61 is a remarkable double star of the 5th and 6th magnitudes, the distance of these stars being 16″.

This most interesting of the stellar systems has connected with it many important facts. They revolve around each other in 540 years. These are the first stars whose distance from the earth was correctly known.

This great discovery was made by Bessel at Kœnigsberg about the year 1839. He found their distance to be 592,000 times the earth's mean distance from the sun, and that their light travels down to us in $9\frac{1}{4}$ years.

"These remarkable facts seem to indicate, that there is a brilliant planetary system in this constellation, which in some of its revolutions becomes visible to us."

In the year 10,200, α in the Swan will be 7° from the pole of the earth, and in the year 11,400 δ will be only 3° from the pole, and consequently the pole star.

Lyra.—*The Harp,*

Is on the meridian at 9 o'clock, about the 13th of 8th month, (August.) α or *Vega*, also called *Lucid Lyræ*, is one of the brightest stars in the northern hemisphere. In the year 13,800 it will be 5° from the north pole; it may be easily known by its forming with ε and ζ a small equilateral triangle. β or *Shelica*, γ or *Sulaphat*, δ, η and ϑ may be traced from the maps.

β is a quadruple variable star, varying from the 3d to the 5th magnitude in 6 days, 10 hours, 35 minutes.

α has a small component of the 11th magnitude; its distance from our sun is 771,400 times the earth's mean distance from that orb.

E. H. Burritt says, "this is the celestial lyre which Apollo, or Mercury, gave to Orpheus, and upon which he played with such a masterly hand, that even the most rapid rivers ceased to flow, the wild beasts of the forest forgot their wildness, and the mountains came to listen."

The lyre was much used in ancient times; some say it was invented by Mercury, in the year of the world 2000; others say by "Jubal, who was the father of all such as handle the harp." (Genesis, 4th c., 21st v.)

Vul-pē'cūla et Anser.—*The Fox and Goose.*

This constellation was established by Hevelius, and contains many small stars.

Tau'rus Po-nī-a-tow'skī.—*The Polish Bull,*

Was established by Poczubut, a Polish astronomer, in the year 1778, in honour of the king of Poland. It contains a beautiful little group of stars in his face in the shape of the letter V. They serve to show where the solstitial colure passes the equatorial. It is midway between the poles, also between the vernal and autumnal equinoxes. The chief stars are k, n, o, p.

The star p is one of the stellar systems that has attracted much attention, on account of the swiftness of its motion. Its components are of the 7th and 8th magnitudes, and perform a revolution in 93 years, being a little longer than the planet Uranus, or Herschel, which performs a revolution in about 84 years.

Ser-pen-ta-ri-us or Ophiūchus.—*The Serpent Bearer,*

Is on the meridian about the 26th of 7th month, (July.)

The chief stars are, α *Ras Alhague*, β *Celbabrai*, γ, σ, κ, λ *Marsic*; η, ρ, B, ϑ, ζ, φ; δ *First Jed*, ε *Second Jed.*

The Serpent Bearer, together with the serpent which he holds in his grasp, occupies a very large space in the heavens. The serpent embraces a long string of stars stretching from the Northern Crown, down through the Serpent Bearer and the milky way, ending under Poniatowski towards the Eagle. The chief stars are, β, γ, κ, δ *Jed*, λ *Marsik*, α or *Unuk al Hay*, ε, μ. τ is one of the stellar systems. There a sun revolves around another sun, requiring in its revolution between 90 and 110 years.

The *Serpent Bearer* was formerly called Æsculapius, who was son of Apollo, and said to have been the inventor of medicine. He was worshipped as the God of the healing art. By his skill he restored Hippolytus to life, which so enraged Jupiter that he killed him with a thunderbolt.

Her'cu-lēs et Cer'be-rus,

Is on the meridian at 9 o'clock, about the 20th of 7th month, (July.)

The chief stars are, α *Ras Algethi*, β *Rutilicus vel Kornephorus*, γ h; δ, λ *Masini*, μ, ξ, ο, D, C; ζ, ε, *u*; π, e, ρ; ϑ, η, σ, between γ and h is the small star ω or *Kajam* or *Guiam* or *Gujam.*

It is generally believed among astronomers that the sun is moving through space, taking the whole solar system with it. If in one part of the heavens the stars grow brighter, and spread farther apart, while in the opposite part they grow dimmer, as well as nearer together, we must come to the conclusion that we are moving towards the former, and receding from the latter.

E. O. Kendall, in his Uranography, states, "*It is now ascertained that our system is moving towards the small star u Herculis; the velocity of our system in this direction is estimated by Struve to be about eight miles per second.*

O. M. Mitchell, A. M., in his "Planetary and Stellar Worlds," says:—"*The sun, attended by all its planets, satellites, and comets,* is sweeping through space towards the star marked π in the constellation Hercules, with a velocity which causes it to pass over a distance equal to thirty-three millions, three hundred and fifty thousand miles in every year."

Moving at this rapid rate towards that distant luminary, it is natural to inquire when the earth will reach its destination? If we suppose π to remain stationary, and our system to move on at its present rapid motion towards that lucid point, it cannot accomplish the journey in less than *one million eight hundred thousand years.*

The sun is performing its immense circuit through space, taking the planets and satellites along in its mighty career. Dr. Mädler, of Dorpat, Russia, has come to the conclusion that Alcyone, the largest star in the Pleiades, now holds the high rank of the CENTRAL SUN, and that its distance is so great that light, which travels twelve millions of miles in a minute, cannot reach us from that star in less than five hundred and thirty-seven years; while our sun would require eighteen millions two hundred thousand years to pass over that immense space.

To Him who created so many worlds, gave them so much space to perform their harmonious march, and who witnesses their mighty revolutions, without change, "a thousand years are as one day." When we consider every twinkling star we see in the heavens as a sun; every sun the center of a system, having worlds innumerable depending on it for light and heat, we cannot wonder that the inspired philosopher "was afraid of being overlooked in the immensity of God's works."

Should it not be the inquiry of every one: What can I best do to praise Him who, by his power having created, still sustains so many worlds, but who is not unmindful of the smallest part of his creation; for the very hairs of our head are all numbered?

The two stars forming the double star ζ in Hercules, revolve, the one around the other, in a period of thirty-five years.

δ contains another system; the stars are of the 3d and 6th magnitude. They complete their revolutions in about 31 years. It was discovered by Sir Wm. Herschel to be double, but its companion was missed. His observations on this star furnished us with a new phenomenon in astronomy, "the occultation of one star by another."

According to ancient history there were many persons who were distinguished by the name of Hercules. The honour of the whole is given to the son of Jupiter and Alcmena, who was the most celebrated. He is represented on the celestial maps with a massive club in his right hand, Cerberus in his left, and clad in a coat of lion's skin. He was one of the great gods of the Egyptians.

Dupuis considers the twelve labours of Hercules, as a figurative representation of the sun in its course through the twelve signs of the zodiac.

In his twelfth great labour he took Cerberus, the guardian of the infernal regions, and brought him up to the earth. Hesiod represents him as a dog, with a hundred fiery serpent-heads, though our mythologists give him only three, the remainder being beaten off by Hercules.

Co-ro'na Bō're-al-is.—*The Northern Crown,*

Is on the meridian at 9 o'clock, about the 1st of 7th month, (July.)

The circular appearance of this beautiful little group of stars, so nearly represents a crown, that they may be easily traced out in the heavens by referring to the maps, and when once traced, they make a lasting impression on the mind.

The chief stars are, α or *Gemma*, or *Alphacca* or the *Jewel*, so called from its situation and size, β or *Nasakan*, ϑ, γ, δ, ε.

η is a double star of the 5th and 6th magnitude; they revolve around each other in forty-three years.

This constellation is in commemoration of the crown given by Baccus to Ariadne, daughter of Minos, second king of Crete.

Bo-o'tes.—*The Herdsman, or Bear Driver,*

Is on the meridian about the 9th of 6th month, (June.)

The chief stars are, α *Acturus*, η *Mufried*, υ, ϵ *Izar*, ρ; β *Nekkar*, γ, δ, μ *Alkalurops*, ϑ; ξ, o, π and ζ.

μ is a binary star, revolving in a retrograde order in about 300 or 400 years.

Of the two greyhounds, with which Bootes drives the great bear, that on the north is called *Asteron*, and *Chara* on the south.

The chief stars are in Chara, a *Cor Caroli* or *Charles's Heart*, in memory of King Charles the First, and d.

Co'ma Ber-e-ni'ces.—*Berenice's Hair,*

Is on the meridian about the 13th of 5th month, (May.)

The stars in this beautiful cluster are all small, having very much the appearance of the milky way, being very rich in beautiful nebulæ.

Berenice was a beautiful lady of royal descent, and wife of Ptolemy Soter, or Evergetes, king of Egypt. When Evergetes was going on a dangerous expedition into Syria, 247 B. C., his wife vowed, if he returned to her in safety, that she would dedicate her beautiful hair to the goddess of beauty. On his safe return, the locks were hung up in the temple of Venice; but were soon missed, and their loss could not be accounted for, until Conon of Samos, a great astronomer of that time, silenced the troubles of the king and queen, by publickly reporting that Jupiter had taken the locks from the temple and placed them among the stars. At the request of the king, Conon went to him, and pointed out the constellation, saying, "There, behold the locks of the queen." The king was satisfied, and the queen reconciled to the partiality of the gods.

Ca'nis Minor.—*The Little Dog,*

Is on the meridian on the 24th of 2d month, (February.)

The chief stars are, α *Procyon*, and β *Mirza* or *Gomeiza.*

The Greeks say this was one of Orion's hounds, others say it was Anubis, (or dog's head) one of the Egyptian gods. And according to others, it was the faithful dog Mira, which showed Erigone where her murdered father was thrown.

Hydra.—*The Water Serpent,*

Is a long winding constellation stretching from west to east, just above

the southern horizon in the spring; and it is 7 hours in passing the meridian. Its western part comes on the meridian about the 5th of 3d month, (March,) and the eastern the 25th of 6th month, (June.)

The chief stars are, δ, ε, ζ, η, ϑ, α *Alphard* or *Cor-Hydra*; λ, υ, ξ, β; φ, γ, π.

This terrible monster infested the Lake Luna, in the Peloponnesus. According to Diodorus it had a hundred heads; Simonides said it had fifty; Apollodorus and Hyginus give it nine, but we accord it only one.

The destruction of this dreadful monster was one of the TWELVE LABOURS OF HERCULES.

Cra'ter.—*The Cup*,

Is on the meridian about the 1st of 5th month, (May.)
The chief stars are, α *Alkes*, β, δ, ϑ.

Corvus.—*The Crow*,

Is on the meridian about the 12th of 5th month, (May.)
The chief stars are, α *Al Chiba*, ε, β, γ, δ *Algorah*, η.

The fable says this crow was of the purest white, but was changed to sooty blackness for its talebearing. Apollo, being jealous of Coronis, daughter of Phlegyas, sent this crow to watch her; it discovered her partiality for Ischys, the Thessalian, and immediately informed Apollo of her conduct. As a reward for this discovery the crow was placed among the constellations.

Mo-no-ce-ros.—*The Unicorn*,

Occupies a large space in the heavens. It was established by Hevelius, out of the unconstellated stars between the dogs and the ship. The stars are few, small, and scattered.

a is a triple star of 6½, 7, and 8th magnitudes, discovered by Sir W. Herschel, and by him said to be one of the most beautiful sights in the heavens.

Ar'go Na'vis.—*The Ship Argo*,

Is on the meridian about the 3d of 3d month, (March.)
It is so near the horizon that its principal stars are not visible to us.
The chief of those we can see are, π, κ *Markeb*, ξ, ι, c, ζ.

The fable says, this is the ship that Jason and his companions went in, on their celebrated expedition to recover the golden fleece. On his victorious return, it was drawn ashore at the isthmus of Corinth, and consecrated to Neptune, the god of the sea.

It is believed by some that Argo Navis was the first large ship ever built, and that it was no other than the ark in which Noah and his family were saved.

Ca'nis Major.—*The Great Dog,*

Is on the meridian about the 11th of the 2d month, (February.)

The chief stars are, α *Sirius*, β *Mirza*, γ *Muliphein*, δ *Wezen*, η *Aludra*, ε *Udara*, σ, ζ *Furud.*

α, or the dog star, is the brightest fixed star we see in the heavens. In ancient times, before the Almanac was in use, when every man was his own astronomer, the rising of this star was watched with much care. It was then that the stars were for signs and seasons. The ancient Thebans determined the length of their year by the number of its risings. When the sun rose with it the season was called *dog days*, which is the origin of that familiar phrase.

The Egyptians carefully watched its risings. As a faithful dog warns his master of approaching danger, so the rising of this star, before the morning rays, marked the time for them to leave their habitations and pleasant homes, and retire to the mountains, or be buried in the floods of the rising Nile.

The Greeks say this was one of Orion's hounds.

O-ri'on.

This most beautiful constellation culminates at 9 o'clock, about the 23d of 1st month, (January.)

The chief stars are, α *Betelgeuse*, β *Rigel*, γ *Bellatrix*, δ *Mintaka*, ε *Anilam*, ζ *Antiak*, η, ϑ and κ *Saiph.*

The equator, passing through the center of this splendid constellation, makes it visible in all parts of the world.

σ, ε and ζ are called the *Three Stars*, there being no others exactly like them. They are called the *Three Kings*, as they point out Hyades and Pleiades on one side, and the Dog Star on the other.

The ancient shepherds called them *Jacob's Staff*, or the *Rake.* In 1807 the University of Leipsic called them *Napoleon.* As they just measure three degrees, they, with the three in the sword, are called "*Ell* and *Yard.*" Job, chap. 38, v. 31, calls them "the *bands of Orion.*"

Near ϑ is one of the most beautiful and remarkable nebulæ in the heavens.

Orion, son of Neptune, became the greatest hunter in the world. Being vain of his glory, he boasted that he could conquer any animal on the earth; but the Scorpion punished his vanity by stinging his foot, so that he died.

Le'pus.—*The Hare,*

Is on the meridian about the 24th of 2d month. (January.)

The chief stars are, α *Armeb*, β *Nihal*, γ, δ which form a trapezium.

This is one of the animals that Orion delighted to hunt.

Co-lum'ba.—*Noah's Dove,*

Is south of the Hare, and on the same meridian.

The chief stars are, α *Phaet*, β, γ and ε.

It was introduced in 1679 by Roger, in honour of Noah's dove. "And the dove came in to him in the evening, and lo, in her mouth was an olive leaf plucked off."

E-rid'a-nus.—*The River Po,*

Occupies a large irregular meandering space in the heavens, having a northern and southern branch.

The chief stars are, β *Cursa*, ο *Beid*, γ *Zaurak*, δ *Rana*, s, t, m, l, 1 and 2, υ *Themin*, *r*, *x*, *f*, *e*, and α *Ahernar*, so far south as not to be seen in this latitude.

Eridanus was the ancient name for the river Po, in the north of Italy.

Phaeton, son of Phœbus and Clymene, became a favourite of Venus, which made him vain. He was struck by Jupiter with a thunderbolt, and hurled headlong from heaven into Eridanus, for threatening heaven and earth with a universal conflagration, by his rashness in attempting to guide the sun's bright chariot in his course.

Ce'tus.—*The Whale,*

The western part of this large constellation is on the meridian at 9 o'clock the 9th of 11th month, (Nov.) and the eastern at the same hour on the 25th of 12th month, (December.)

Its chief stars are, α *Menkar*, γ, υ, μ, λ; δ, ο *Mira*, ζ *Batan Kaitos*, τ; π, ε, ρ, σ; β *Diphda* or *Deneb Kaitos*, η, ϑ, ι.

ο, *Mira*, is the wonderful star of 1596. Fabricius on the 13th of 8th month, (August,) 1596, first discovered it to be a variable star. It varies in 332 days from a star of the 3d magnitude to invisibility.

Cetus is supposed to be the sea monster that was sent to ravage the coast of Joppa, where Andromeda was chained to the rock, and left to be devoured, in order to punish Cassiopea for her boasted beauty; but just as the monster was going to destroy her, Perseus killed him. To perpetuate their memory, they have all been placed among the constellations.

QUESTIONS.

INTRODUCTION.—What is the *zenith?* What is the *horizon?* What is the *celestial meridian?* What is the *North pole?* What is the *pole star?* What is the axis? What are the *poles of the earth?* What is the *earth's axis?* What course does the earth move in its daily revolution, and what is its effect on the celestial bodies? What is the *terrestrial equator?* The *celestial equator?* The *sun's apparent yearly path?* What are the *equinoxes?* The *solstices?* The *colures?* The *hour circles?* What is the vernal equinox? Where does the sun appear after it passes the vernal equinox? At what time does the sun pass it, and when are the stars visible? The summer solstice? The autumnal equinox? The winter solstice? And when are the stars about these points visible? What is meant by the sun's crossing the line? What is the *zodiac*, and how is it divided? How many planets have been discovered? What are their names? How much earlier do the stars pass the meridian each successive night? What does that amount to in a month, and how will the stars appear in a month? In six months? What are *circumpolar stars?* How do they change in six months? What can the pupil take for easy and familiar reference? How must the pupil stand and hold the map? What will be seen? What are the *Fixed Stars?* What is the *declination?* First meridian? *Right ascension?* How can it be told when a star will be on the meridian at 9 o'clock? Give the Greek alphabet. Write it. Now read it backwards. For what is this work intended? What is the first step? The second?

How are the principal stars in the Little Bear situated? Where is the Pole star? Give the Greek letters as applied to the stars. Give the *guards of the Little Bear.* For what is this constellation noted? What use is the pole star to the practical surveyor? Is this star in the true north? How far off is it? How often does it pass the meridian? When is the proper time to make observations on this star? How can surveyors know the variation of their needle? What would an observer on the equator see? By travelling to the north what change takes place? What result will be the *latitude of the place?* Half what sum will be the latitude of the place? Is the pole star a fixed point? Which way is it moving? When will it be only 20′ from the pole? What is its annual variation?

URSA MAJOR—*The Great Bear.*—Is this a small constellation? When, and how long can it be seen? Give the Greek letters as applied to the principal stars in this constellation. Point them out on the map for this season. Which are the pointers? Why so called? Give the stars in the *dipper.* Give all their distances. What will the student have?

CASSIOPEA—*Lady in the Chair.*—How is she represented? Give the Greek letters. What is this group like? Where are β and δ? Give

another rule for obtaining the latitude of the place. Also for the variation of the compass. Who are the royal family? What is said of Cassiopea?

CEPHEUS—*The King.*—Give the chief stars. Where is his head? By what stars may it be easily traced? When is it on the meridian? By examining the maps what will be seen? When may it be seen? What takes place in 25,600 years? When will γ be the pole star? When β? When α?

ANDROMEDA.—When will it be on the meridian? Give the principal stars. What stars mark out the position of the first meridian?

PERSEUS ET CAPUT MEDUSÆ.—When is it on the meridian? What must be remembered? Give the Greek letters applied to the chief stars. Point them out on the map. What is Medusa's head? When will β be on the meridian? What hour? How does β change? Give Dr. Herschel's opinions.

AURIGA—*The Wagoner.*—When on the meridian? Give the chief stars. What do they form? What have we while the Wagoner is on the meridian?

PISCES—*The Fishes.*—What is it now? When on the meridian? When does the sun enter this sign? When does he reach the constellation? Do the sign and constellation occupy the same space? What does this constellation occupy? Where does it commence? What course does it take? Where does it end? What is the probable origin of this sign?

ARIES—*The Ram.*—What sign is it? What constellation? When on the meridian? When was Aries the first sign in the zodiac? What is it now? What use is α Aries? Should the mariner get lost what can he do? Give the stars used by mariners in full?

TAURUS—*The Bull.*—What took place in the days of Noah? How long? What next? What now? When is Taurus on the meridian? Give the chief stars. What stars are called *Hyades?*

GEMINI—*The Twins.* When does it culminate? Give the chief stars. When does the sun pass through this constellation?

CANCER—*The Crab.*—Give the chief stars. When is it on the meridian? When does the sun reach this constellation?

LEO MAJOR—*The Great Lion.*—When on the meridian? Give the chief stars. Who was α named from? Where is it? What used by?

VIRGO—*The Virgin.*—When on the meridian? When does the sun enter this sign? When the constellation? Give the chief stars. What does γ afford? How far does the earth move per minute? How large is Jupiter? The sun? What would the sun fill up? What are the fixed stars? What is γ? What do we behold?

LIBRA—*The Scales.*—When on the meridian? When does the sun enter this sign? When reach the constellation? Give the chief stars. What do they form? When are the days and nights equal? Are the sign and constellation the same? What must be remembered?

SCORPIO—*The Scorpion.*—When does the sun enter this sign? Reach the constellation? On the meridian? Give the chief stars. What do they form?

SAGITTARIUS—*The Archer.*—When does the sun enter this sign? Reach the constellation? On the meridian? Chief stars?

CAPRICORNUS—*The Goat.*—When on the meridian? When does the sun arrive at this sign? The constellation? Give the chief stars.

AQUARIUS—*The Water-bearer.*—When on the meridian? What stars form Y. Repeat the lines written by T. B. DORSEY.

PISCIS AUSTRALIS—*The Southern Fish.*—When on the meridian? Give the chief stars.

ANTINOUS.—Give the chief stars.

AQUILA—*The Eagle.*—When on the meridian? Give the chief stars. For what is α used?

DELPHINUS—*The Dolphin.*—When on the meridian? Give the chief stars.

PEGASUS—*The Flying Horse.*—When does the western part pass the meridian? The eastern? Give the chief stars. What stars form the *great square of Pegasus?* What stars show where the first meridian is? When on the meridian? Where does it cut the equator? When does the sun cross it?

CYGNUS—*The Swan.*—How is it represented? Where is α? When on the meridian? Give the chief stars. What do they form? What does Dr. Herschel say? What is said of γ? Of φ? What is said of a variable star? What is said of 61? What is its mean distance from the sun? In what time does its light travel to us? What do these facts indicate? When will α be 7° from the pole, and δ 3°?

LYRA—*The Harp.*—When on the meridian? What is said of α? What does it form with ε, and ζ? Give the other stars. What is said of β? How far is α from the sun?

TAURUS PONIATOWSKI—*The Polish Bull.*—What is said of the stars in his face? What do they show? Midway between what? Give the chief stars. What is said of p?

SERPENTARIUS VEL OPHIUCHUS—*The Serpent Bearer.*—When on the meridian? Give the chief stars. What is said of the Serpent? Give the chief stars. What is said of τ?

HERCULES ET CEBERUS.—When on the meridian? Give the chief stars. What is generally believed among astronomers? Give a reason. What does E. O. Kendall say? O. M. Mitchell? Dr. Mädler? What is said of ζ? Of δ? What did Wm. Herschel observe?

CORONA BOREALIS—*The Northern Crown.*—When on the meridian? What is the appearance? Give the chief stars. What is η?

BOOTES—*The Herdsman.*—When on the meridian? Give the chief stars. What is μ? Give the chief stars in CHARA.

CANIS MINOR—*The Little Dog.*—When on the meridian? The chief stars?

HYDRA—*The Water Serpent.*—What is said of it? When does its western part come on the meridian? Eastern? Give the chief stars.

CRATER—*The Cup.*—When on the meridian? Give the chief stars.

CORVUS—*The Crow.*—When on the meridian? Give the chief stars.

ARGO NAVIS—*The Ship Argo.*—When on the meridian? Give the chief stars visible.

CANIS MAJOR—*The Great Dog.*—When on the meridian. Give the chief stars. What is α? What is said of it? Of the ancient Thebans? Of *dog days?* Of the Egyptians? What is said of the rising of this star?

ORION.—When does it culminate? Give the chief stars. Where does the equator pass? What does it make? What are δ, ε, ζ called? What is near ϑ?

LEPUS—*The Hare.*—When on the meridian? The chief stars?

COLUMBA—*Noah's Dove.*—Give the chief stars.

ERIDANUS—*The River Po.*—How many branches? Give the chief stars.

CETUS—*The Whale.*—When is the western part on the meridian? The eastern? Give the chief stars. What is said of o?

HENRY WHITALL'S MAP of the HEAVENS AS SEEN in the SUMMER.
NORTHERN HORIZON
LYNX
CAMELEOPARD
PERSEUS
CEPHEUS
CASSIOPEIA
GREAT BEAR
LITTLE BEAR
LITTLE LION
TRIANGLES
ANDROMEDA
LIZARD
PEGASUS
SWAN
DRAGON
LYRE
FOX
GREY HOUNDS
HAIR
BOOTES
N. CROWN
HERCULES
VIRGIN
EQUATOR
EARTH'S ORBIT OR ECLIPTIC
LITTLE HORSE
DOLPHIN
EAGLE
BULL of PONIATOWSKI
SERPENT BEARER
ANTINOUS
WATER BEARER
SHIELD
GOAT
SCALES
CROW
SCORPION
WATER SERPENT
SOUTHERN FISH
ARCHER
S. CROWN
CENTAUR
WOLF
CRANE
ALTAR
SOUTHERN HORIZON
EASTERN HORIZON
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